3.7 IERS Working Groups

3.7.1 Working Group on Site Survey and Co-location

At the Unified Analysis Workshop in the fall of 2019, discussions were had and a determination made to spend time to refocus the working group on standard field procedures, error budgets, and sharing research on site survey improvements. The approved Terms of Reference are listed here and the accomplishments of full year 2019 follow.

Terms of Reference

The International Terrestrial Reference System is built upon multiple geodetic techniques; Satellite Laser Ranging (SLR), Very Long Baseline Interferometry (VLBI), Doppler Orbitography and Radiopositioning Integrated by satellite (DORIS), and Global Navigation Satellite Systems (GNSS). At locations where these techniques are co-located, it is vital to determine and understand the vectors between the reference points of each technique. These vectors are determined by local tie surveys conducted terrestrially with various procedures and geodetic instruments. The reference points should be collected and properly aligned to a global reference frame in order to produce relative and absolute coordinates.

As the science of local tie surveys has developed, so has technology and the expectation of higher precision and improved protocols. It is the desire of this working group to investigate the current and expected best practices available, along with documenting past efforts, both in the field and researched. This working group will share methodology of existing tie surveys, continued to develop and document recommended procedures, and also archive surveys completed by all agencies represented. In addition, efforts will be made to isolate systematic errors of the space geodetic techniques using surveying methods and investigate field procedures that could be completed during the course of a tie survey in order to provide the operator valuable feedback on potential physical errors found onsite. One critical example of this is quantifying thermal and gravitational deformation in VLBI sensors. It is the overall goal of the working group to encourage consistent field practice, terminology, and documentation throughout the community, with a continued eye on the future of tie surveys.

Objectives/Activites

- Enhance and improve knowledge of local tie surveys through applied field practice, research, and dissemination of materials developed.
- Investigate thermal and gravitational deformation

- Consider importance and inclusion of DoV observations
- Discuss overall error budget and precision (achieved/necessary)
- Continue to enhance guidelines on procedures
- Archive reports, tie vectors and raw data of tie surveys
- Gather, distribute, and maintain publications on related matters
- Coordinate with and solicit feedback from all geodetic techniques

Recent survey activities and presentations

The US National Geodetic Survey conducted an IERS local site survey at the National Radio Astronomy Observatory in Maui (GNSS and SLR), the Table Mountain Geophysical Observatory in Colorado (new GNSS, gravity), and Midway Naval Research Laboratory's OTF in Virginia (GNSS and SLR). Reports and SINEX files were provided to the IERS. In addition, NGS fully implemented the use of an absolute laser tracking system (Leica AT402) into the completed tie surveys, enhancing precision of terrestrial observations. Progress was made on technical memorandum documenting current NGS procedures which will be released and reflect upon IERS TN39.

Pesce, D., Saunier J. (2019) IGN Recent and Planned Local Site Survey Activities & Contribution to the EURAMET GeoMetre Project. Proceedings of the Unified Analysis Workshop 2019. http://ggos.org/media/filer_public/9f/b6/9fb60a43-3d60-4218-9f48-89ac81073b79/uaw_sitesurvey_2-saunier_ignrecentactivities.pdf

Fancher, K., Hippenstiel, R. (2019) US National Geodetic Survey - Recent and Planned Local Site Survey Activites. Proceedings of the Unified Analysis Workshop 2019. http://ggos.org/media/filer_public/ff/67/ff679767-62ec-4065-acfc-3394ae85d573/uaw_sitesurvey_1-hippenstiel_usnationalgeodeticsurvey.pdf

Publications

M. Lösler, C. Eschelbach, S. Riepl, T. Schüler (2019) A Modified Approach for Process-Integrated Reference Point Determination. Proceedings of the 24th European VLBI Group for Geodesy and Astrometry Working Meeting, 17-19 March 2019, Las Palmas de Gran Canaria, Spain, Eds. R. Haas, S. Garcia-Espada, and J. A. López Fernández, 172–176. DOI: 10.7419/162.08.2019

Co-location survey: online reports http://itrf.ign.fr/local_surveys.php and https://www.ngs.noaa.gov/corbin/iss/

- Erickson, B., Breidenbach, S., Jordan, K. Maui co-location survey, June 2019
- Jordan, K., Hippenstiel, R., Erickson, B., Fancher, K. Stafford co-location survey, October 2019
- Jordan, K., Hippenstiel, R., Fancher, K. Table Mountain co-location survey, October 2019

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